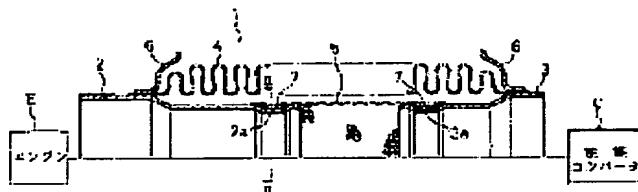


**FLEXIBLE TUBE OF ENGINE EXHAUST SYSTEM****Patent number:** JP9268913**Publication date:** 1997-10-14**Inventor:** KAMIKANE MASAYUKI**Applicant:** HONDA MOTOR CO LTD**Classification:****- international:** F01N7/16; F01N7/08; F02B77/11; F16L27/10;  
F16L59/153**- european:****Application number:** JP19960081693 19960403**Priority number(s):****Report a data error here****Abstract of JP9268913**

**PROBLEM TO BE SOLVED:** To satisfactorily rise an exhaust temperature in a early stage by forming a heating guard tube with a cylindrical cloth made of carbon fiber, in a device provided with in a bellow shaped tube main body, in a flexible tube interposed on the upstream side of a catalytic converter.

**SOLUTION:** A flexible tube 1 interposed in the exhaust system of an engine E consists of engine pipes 2, 3 for connecting an exhaust pipe and a catalyst converter C to each other, a bellows shaped tube main body 4 made of metal, and a heat guard tube 5. In the tube main body 4, both end part thereof are fitted around the end pipes 2, 3, and it is welded on the end pipes 2, 3 together with a connector 6. The heat guard tube 5 is arranged in the tube main body 4, in this case, the heat guard tube 5 is formed of a cylindrical cloth made of carbon fiber. In the heat guard tube 5, a catalyst is activated earlier, since the heat mass thereof is smaller extremely.



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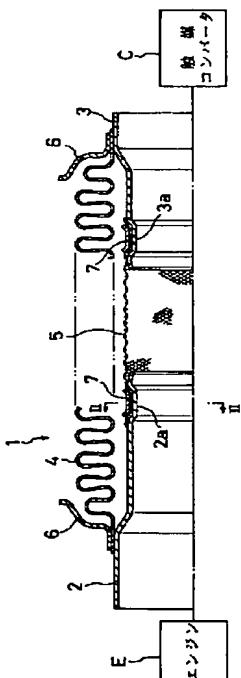
(74)代理人 弁理士 北村 欣一 (外2名)

(54)【発明の名称】 エンジン排気系のフレキシブルチューブ

(57)【要約】

【課題】 エンジンEの排気系に触媒コンバータCの上流側に位置させて設けるフレキシブルチューブ1において、振動吸収効果を向上させると共に、ヒートマスを小さくして触媒コンバータCに流入する排気温度の立ち上がりを早くする。

【解決手段】 蛇腹状のチューブ本体4内に設けるヒートガードチューブ5を炭素繊維の筒状織物で構成する。



## 【特許請求の範囲】

【請求項1】 エンジンの排気系に触媒コンバータの上流側に位置させて介設するフレキシブルチューブであって、蛇腹状のチューブ本体内にヒートガードチューブを設けるものにおいて、ヒートガードチューブを炭素繊維の筒状織物で構成することを特徴とするエンジン排気系のフレキシブルチューブ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、主として車両に搭載するエンジンの排気系に介設するフレキシブルチューブに関する。

## 【0002】

【従来の技術】 エンジンの排気系に触媒コンバータの上流側に位置させてフレキシブルチューブを介設し、排気管を介して伝達されるエンジン振動をフレキシブルチューブで吸収して、触媒コンバータの防振を図ることが知られている。

【0003】 フレキシブルチューブは、図3(A)に示すように、蛇腹状のチューブ本体aと、チューブ本体aの両端部に内嵌固定した1対のエンドパイプb、bと、チューブ本体a内に両エンドパイプb、bを接続するよう設けたヒートガードチューブcとで構成される。ヒートガードチューブcは、弾性変形によって可動するチューブ本体aが高温になり強度低下するのを防止するために設けられるものであり、従来は、図3(B)に示すように、金属製の帯板dをその幅方向一側の折返縁d aに他側の折返縁d bを係合させつつ螺旋状に巻回してヒートガードチューブcを構成している。

## 【0004】

【発明が解決しようとする課題】 上記従来のヒートガードチューブcは、折返縁d a、d bの係合箇所の遊びや折返縁d a、d bの弾性変形によって撓みを生じ得るが、その可撓性は蛇腹状チューブ本体aの可撓性より低く、振動吸収能力がヒートガードチューブcによって制限されてしまう不具合があった。また、従来のヒートガードチューブcはヒートマスが大きく、エンジン始動後暫くは排気熱がヒートガードチューブcに奪われて、触媒コンバータに流入する排気温度の立上りが遅れ、触媒が活性化されるまでに時間がかかるといった不具合もあった。

【0005】 本発明は、以上の点に鑑み、振動吸収能力を向上させて、且つ、排気温度の立上りを早くできるようにしたフレキシブルチューブを提供することを課題としている。

## 【0006】

【課題を解決するための手段】 上記課題を解決すべく、本発明は、エンジンの排気系に触媒コンバータの上流側に位置させて介設するフレキシブルチューブであって、蛇腹状のチューブ本体内にヒートガードチューブを設け

るものにおいて、ヒートガードチューブを炭素繊維の筒状織物で構成することを特徴とする。

【0007】 このような筒状織物で構成したヒートガードチューブは殆んど抵抗なく撓み、従って、フレキシブルチューブの振動吸収能力が向上する。また、炭素繊維製であるためヒートガードチューブのヒートマスは極めて小さくなり、触媒コンバータに流入する排気温度の立上りが早くなつて、排気浄化効率が向上する。また、ヒートガードチューブを筒状織物にすることで製造が容易になり、取扱いも楽になる。

## 【0008】

【発明の実施の形態】 図1を参照して、1はエンジンEの排気系に触媒コンバータCの上流側に位置させて介設したフレキシブルチューブであり、該チューブ1は、エンジンEに連なる排気管を接続する入口側のエンドパイプ2と、触媒コンバータCを接続する出口側のエンドパイプ3と、蛇腹状の金属製のチューブ本体4と、ヒートガードチューブ5とで構成されている。

【0009】 チューブ本体4は、その両端部において両エンドパイプ2、3に外嵌され、端部外周に装着する口金6と共にエンドパイプ2、3に溶接される。両エンドパイプ2、3は内端側を小径とした段付形状に形成されており、チューブ本体4内に、両エンドパイプ2、3の内端部間に跨らせるようにしてヒートガードチューブ5が設けられている。

【0010】 ヒートガードチューブ5は、炭素繊維を筒状に織り上げた筒状織物で構成されている。そして、ヒートガードチューブ5の各端部を各エンドパイプ2、3の内端部にその周面に形成した溝部2a、3aを覆うように外挿し、ヒートガードチューブ5の各端部にバンド7を巻き付け、バンド7を図2に示す如くかしめてヒートガードチューブ5の各端部を固定している。尚、リベット等の他の手段でヒートガードチューブ5を固定しても良い。

【0011】 上記の如き筒状織物で構成されるヒートガードチューブ5は可撓性に富み、フレキシブルチューブ1による振動吸収効果を損うことではない。また、炭素繊維を用いるため耐熱性があり、更に、ヒートガードチューブ5のヒートマスが極めて小さくなり、そのため触媒コンバータCに流入する排気温度の立上りが早くなつて触媒が早期に活性化され、排気浄化効率が向上する。

## 【図面の簡単な説明】

【図1】 本発明に係わるフレキシブルチューブの一例を示す縦断面図

【図2】 図1のII-II線截断面図

【図3】 (A) 従来例の縦断面図、(B) 図3(A)のB部の拡大図

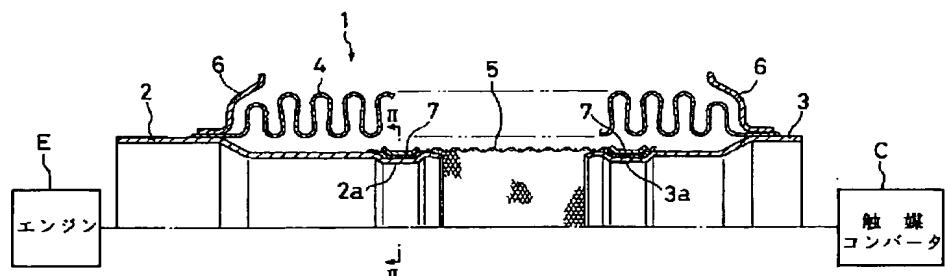
## 【符号の説明】

1 フレキシブルチューブ

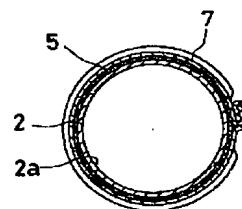
4 蛇腹状チューブ本体

## 5 ヒートガードチューブ

【図1】

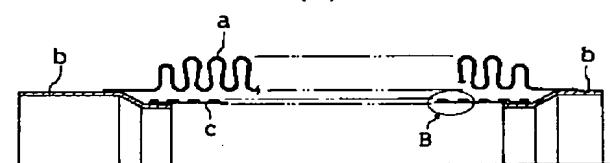


【図2】

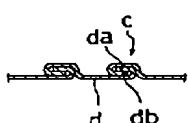


【図3】

(A)



(B)



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(51)Int.CI.

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F02B 77/11

F16L 27/10

F16L 59/153

(21)Application number : 08-081693

(71)Applicant : HONDA MOTOR CO LTD

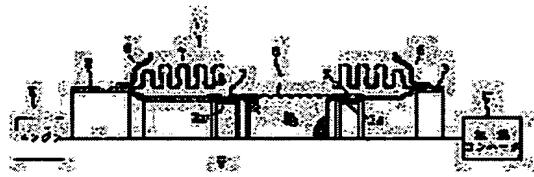
(22)Date of filing : 03.04.1996

(72)Inventor : KAMIKANE MASAYUKI

**(54) FLEXIBLE TUBE OF ENGINE EXHAUST SYSTEM****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To satisfactorily rise an exhaust temperature in a early stage by forming a heating guard tube with a cylindrical cloth made of carbon fiber, in a device provided with in a bellow shaped tube main body, in a flexible tube interposed on the upstream side of a catalytic converter.

**SOLUTION:** A flexible tube 1 interposed in the exhaust system of an engine E consists of engine pipes 2, 3 for connecting an exhaust pipe and a catalyst converter C to each other, a bellows shaped tube main body 4 made of metal, and a heat guard tube 5. In the tube main body 4, both end part thereof are fitted around the end pipes 2, 3, and it is welded on the end pipes 2, 3 together with a connector 6. The heat guard tube 5 is arranged in the tube main body 4, in this case, the heat guard tube 5 is formed of a cylindrical cloth made of carbon fiber. In the heat guard tube 5, a catalyst is activated earlier, since the heat mass thereof is smaller extremely.

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[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

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<http://www19.ipdl.ncipi.go.jp/PA1/result/detail/main/wAAA9QaO9IDA409268913...> 2005/05/25

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## CLAIMS

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[Claim(s)]

[Claim 1] The flexible tube of the engine exhaust air system which is the flexible tube which an engine exhaust air system is located in the upstream of a catalytic converter, and is interposed in it, and is characterized by constituting a heat guard tube from tubed textiles of a carbon fiber in what prepares a heat guard tube in bellows-like the body of a tube.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the flexible tube interposed in the exhaust air system of the engine carried mainly in a car.

[0002]

[Description of the Prior Art] Locating the upstream of a catalytic converter in an engine exhaust air system, interposing a flexible tube, absorbing the engine vibration transmitted through an exhaust pipe with a flexible tube, and planning vibrationproofing of a catalytic converter is known.

[0003] A flexible tube consists of heat guard tubes c prepared so that both the end pipes b and b might be connected with one pair of end pipes b and b which inner-\*\*\*\*\* (ed) to the both ends of the bellows-like body a of a tube, and the body a of a tube into the body a of a tube, as shown in drawing 3 (A). The heat guard tube c is formed in order to prevent the body a of a tube which carries out movable becoming an elevated temperature, and carrying out an on-the-strength fall by elastic deformation, conventionally, as shown in drawing 3 (B), winds the metal strip d spirally, making the cuff edge db of the side else engage with the cuff edge da by the side of the cross direction 1, and constitutes the heat guard tube c.

[0004]

[Problem(s) to be Solved by the Invention] Although the above-mentioned conventional heat guard tube c might produce bending by return by the play of the engagement part of Edges da and db, or the elastic deformation of the cuff edges da and db, the flexibility was lower than the flexibility of the body a of a bellows-like tube, and had the fault to which oscillating absorptance

will be restricted with the heat guard tube c. Moreover, the conventional heat guard tube c had the large heat mass, after engine starting, exhaust air heat was taken by the heat guard tube c, and the standup of the exhaust-gas temperature which flows into a catalytic converter also had the fault of taking time amount before delay and a catalyst are activated, for a while.

[0005] This invention makes it the technical problem to offer the flexible tube which raises oscillating absorptance and could be made to perform the standup of an exhaust-gas temperature early in view of the above point.

[0006]

[Means for Solving the Problem] That the above-mentioned technical problem should be solved, this invention is a flexible tube which an engine exhaust air system is located in the upstream of a catalytic converter, and is interposed in it, and is characterized by constituting a heat guard tube from tubed textiles of a carbon fiber in what prepares a heat guard tube in bellows-like the body of a tube.

[0007] The heat guard tube constituted from such tubed textiles bends without \*\*\*\*\* resistance, therefore its oscillating absorptance of a flexible tube improves. Moreover, since it is a product made from a carbon fiber, it becomes very small, the standup of the exhaust-gas temperature which flows into a catalytic converter becomes early, and exhaust air purification effectiveness of the heat mass of a heat guard tube improves. Moreover, manufacture becomes easy by using a heat guard tube as tubed textiles, and handling also becomes easy.

[0008]

[Embodiment of the Invention] the entrance side to which 1 is the flexible tube which the exhaust air system of Engine E was located in the upstream of catalytic-converter C, and was interposed in it, and this tube 1 connects the exhaust pipe which stands in a row in Engine E with reference to drawing 1 -- and the outlet side which connects catalytic-converter C with a pipe 2 -- and it consists of a pipe 3, metal bellows-like body 4 of a tube, and a heat guard tube 5.

[0009] The body 4 of a tube is attached outside by both the end pipes 2 and 3 in the both ends, and is welded to the end pipes 2 and 3 with the mouthpiece 6 with which an edge outside periphery is equipped. Both the end pipes 2 and 3 are formed in the configuration with a stage which made inner one end the minor diameter, and in the body 4 of a tube, as it is made to straddle between the toes of both the end pipes 2 and 3, the heat guard tube 5 is formed.

[0010] The heat guard tube 5 consists of tubed textiles which finished weaving the carbon fiber to tubed. And as it extrapolates so that the slots 2a and 3a which formed each edge of the heat guard tube 5 in the toe of each end pipes 2 and 3 at the peripheral surface may be covered, and a band 7 is twisted around each edge of the heat guard tube 5 and a band 7 is shown in drawing 2 , each edge of the heat guard tube 5 is fixed in total. In addition, the heat guard tube 5 may be fixed with other means, such as a rivet.

[0011] The heat guard tube 5 which consists of tubed textiles like the above is rich in flexibility, and does not spoil the oscillating absorption effect by the flexible tube 1. Moreover, the standup of the exhaust-gas temperature which there is thermal resistance in order to use a carbon fiber, the heat mass of the heat guard tube 5 becomes very small further, therefore flows into

catalytic-converter C becomes early, a catalyst is activated at an early stage, and exhaust air purification effectiveness improves.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] Drawing of longitudinal section showing an example of the flexible tube concerning this invention

[Drawing 2] The II-II line cutting side Fig. of drawing 1

[Drawing 3] (A) Drawing of longitudinal section of the conventional example, the enlarged drawing of the B section of (B) drawing 3 (A)

[Description of Notations]

1 Flexible Tube 4 Body of Bellows-like Tube

5 Heat Guard Tube